

What is claimed is:

1. A semiconductor device comprising:

a gate electrode formed extending on a first and second
gate insulation films formed on one conductive type
5 semiconductor substrate;

a reverse conductive type source region adjacent to one
end of said gate electrode;

a first low concentration reverse conductive type drain
region formed facing said source region through a channel
10 region, having high impurity concentration peak at a position
of the predetermined depth at least in said substrate under
said first gate insulation film, and formed so that high
impurity concentration becomes low at a region near surface
of the substrate;

15 a second concentration reverse conductive type drain
region formed so as to range to the first low concentration
reverse conductive type drain region; and

a third concentration reverse conductive type drain
region separated from the other end of said gate electrode and
20 included in said second concentration reverse conductive type
drain region.

2. A semiconductor device comprising:

a gate electrode formed extending on a first and second
gate insulation films formed on one conductive type
25 semiconductor substrate;

a reverse conductive type source region adjacent to one end of said gate electrode;

5 a first low concentration reverse conductive type drain region formed facing said source region through a channel region, having high impurity concentration peak at a position of the predetermined depth at least in said substrate under said first gate insulation film, and formed so that high impurity concentration becomes low at a region near surface of the substrate;

10 a second concentration reverse conductive type drain region formed so as to range to the first low concentration reverse conductive type drain region;

15 a third concentration reverse conductive type drain region separated from the other end of said gate electrode and included in said second concentration reverse conductive type drain region; and

20 a fourth concentration reverse conductive type layer formed so as to span from one end portion of said first gate insulation film to said third concentration reverse conductive type drain region.

3. A semiconductor device according to Claim 1 , wherein said first insulation film is a field oxidation film field-oxidized.

25 4. A semiconductor device according to Claim 1 , wherein said fourth concentration reverse conductive

type layer has high impurity concentration peak at a position of the predetermined depth in said substrate at a region spanning from a position having the predetermined space from one end portion of said first gate insulation film to said third 5 concentration reverse conductive type drain region, and is formed so that high impurity concentration becomes low at a region near surface of the substrate.

5. A method of manufacturing a semiconductor device comprising the steps of:

10 ion-implanting a reverse conductive type impurity in the predetermined region of one conductive type semiconductor substrate;

15 forming a first gate insulation film, a first concentration reverse conductive type drain region under the first gate insulation film, and a second concentration reverse conductive type drain region so as to range to the first concentration reverse conductive type drain region by diffusing said impurity ion-implanted in a heat treatment for field-oxidizing the predetermined region of said substrate;

20 forming a gate electrode so as to span from the first gate insulation film to the second gate insulation film after forming the second gate insulation film on said substrate except said first gate insulation film; and

25 forming a reverse conductive type source region so as to be adjacent to one end of said gate electrode, and forming a

third concentration reverse conductive type drain region facing said source region through a channel region, separated from the other end of said gate electrode, and included in said second concentration reverse conductive type drain region.

5 6. A method of manufacturing a semiconductor device according to Claim 5,

wherein said step of forming a first concentration reverse conductive type drain region and second concentration reverse conductive type drain region comprises a step of 10 diffusing said impurity ion so that the impurity ion-implanted is taken in the first gate insulation film at field oxidation.

10 7. A method of manufacturing a semiconductor device according to Claim 5, further comprising:

15 forming a fourth concentration reverse conductive type layer so as to span from one end portion of said first gate insulation film to said third concentration reverse conductive type drain region.

8. A method of manufacturing a semiconductor device according to Claim 5, further comprising:

20 forming a fourth concentration reverse conductive type layer having high impurity concentration peak at a position of the predetermined depth in said substrate at a region spanning from a position having the predetermined space from one end portion of said first gate insulation film to said third 25 concentration reverse conductive type drain region, and is

formed so that high impurity concentration becomes low at a region near surface of the substrate.

9. A method of manufacturing a semiconductor device according to Claim 7,

5 wherein phosphorus ion is ion-implanted with high acceleration energy of about 100 KeV to 200 KeV at said forming process of the fourth concentration reverse conductive type layer.

10. A method of manufacturing a semiconductor device according to Claim 8,

wherein phosphorus ion is ion-implanted with high acceleration energy of about 100 KeV to 200 KeV at said forming process of the fourth concentration reverse conductive type layer.

15. A method of manufacturing a semiconductor device according to Claim 7,

wherein ion implantation is carried out at a region spanning from a position separated the predetermined space from said first gate insulation film to said third concentration 20 reverse conductive type drain region by using a photo-resist as a mask at said forming process of the fourth concentration reverse conductive type layer.

12. A method of manufacturing a semiconductor device according to Claim 8,

25 wherein ion implantation is carried out at a region

spanning from a position separated the predetermined space from
said first gate insulation film to said third concentration
reverse conductive type drain region by using a photo-resist
as a mask at said forming process of the fourth concentration
5 reverse conductive type layer.

13. A method of manufacturing a semiconductor device
according to Claim 7,

wherein ion implantation is carried out at a region
spanning from a position separated the predetermined space from
10 the first gate insulation film to said third concentration
reverse conductive type drain region by using a side wall
insulation film formed at a side wall portion of said first
gate insulating film as a mask at said forming process of the
fourth concentration reverse conductive type layer.

15 14. A method of manufacturing a semiconductor device
according to Claim 8,

wherein ion implantation is carried out at a region
spanning from a position separated the predetermined space from
the first gate insulation film to said third concentration
20 reverse conductive type drain region by using a side wall
insulation film formed at a side wall portion of said first
gate insulating film as a mask at said forming process of the
fourth concentration reverse conductive type layer.

15. A method of manufacturing a semiconductor device
25 according to Claim 7,

wherein said fourth concentration reverse conductive type layer is formed at a region spanning from a position separated the predetermined space from the first gate insulation film to said third concentration reverse conductive 5 type drain region by ion-implanting from oblique upper side of the first gate insulation film by using said first gate insulation film as a mask at said forming process of the fourth concentration reverse conductive type layer.

16. A method of manufacturing a semiconductor device 10 according to Claim 8,

wherein said fourth concentration reverse conductive type layer is formed at a region spanning from a position separated the predetermined space from the first gate insulation film to said third concentration reverse conductive 15 type drain region by ion-implanting from oblique upper side of the first gate insulation film by using said first gate insulation film as a mask at said forming process of the fourth concentration reverse conductive type layer.

17. A method of manufacturing a semiconductor device 20 according to Claim 7,

wherein said fourth concentration reverse conductive type layer is formed at a region spanning from a position separated the predetermined space from the first gate insulation film to said third concentration reverse conductive 25 type drain region by ion implantation from oblique upper side

by using a photo-resist formed so as to cover said first gate insulation film as a mask at said forming process of the fourth concentration reverse conductive type layer.

18. A method of manufacturing a semiconductor device
5 according to Claim 8,

wherein said fourth concentration reverse conductive type layer is formed at a region spanning from a position separated the predetermined space from the first gate insulation film to said third concentration reverse conductive type drain region by ion implantation from oblique upper side by forming a photo-resist formed so as to cover said first gate insulation film as a mask at said forming process of the fourth concentration reverse conductive type layer.

19. A method of manufacturing a semiconductor device
15 according to Claim 7,

wherein high impurity concentration of said first concentration reverse conductive type drain region is formed so as to become lower than said second concentration reverse conductive type drain region by that said impurity ion-20 implanted is taken in the first gate insulation film at field oxidation.

20. A method of manufacturing a semiconductor device
according to Claim 8,

wherein high impurity concentration of said first concentration reverse conductive type drain region is formed
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so as to become lower than said second concentration reverse conductive type drain region by that said impurity ion-implanted is taken in the first gate insulation film at field oxidation.